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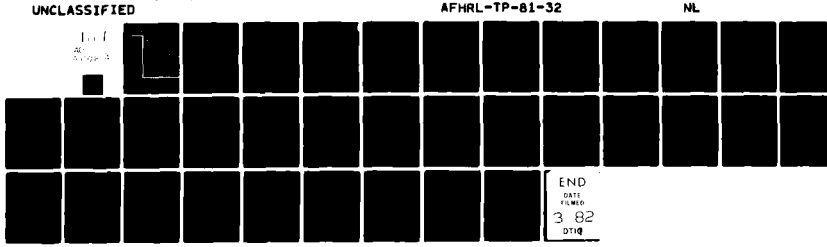

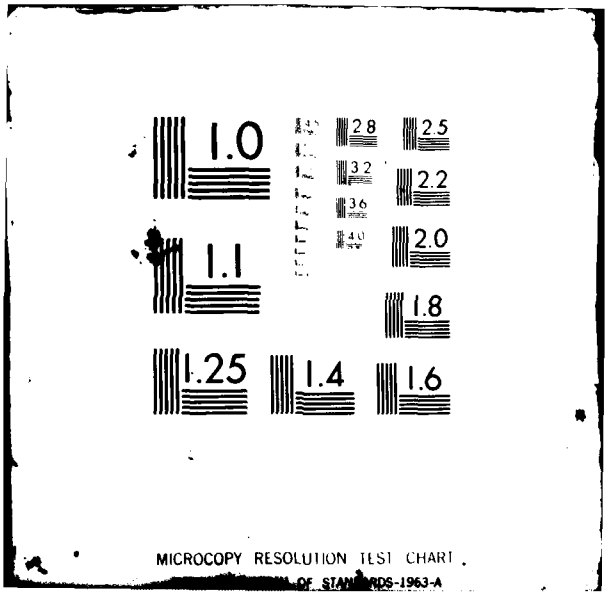
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AIR FORCE HUMAN RESOURCES LABORATORY

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MAINTENANCE ENVIRONMENT IMPROVEMENT ANALYSIS: PHASE II — PRETEST

By

Andrew P. Chenzoff
Reid P. Joyce
Applied Science Associates, Inc.
Box 158
Valencia, Pennsylvania 16059

LOGISTICS AND TECHNICAL TRAINING DIVISION
Logistics Research Branch
Wright-Patterson Air Force Base, Ohio 45433

January 1982

Interim Report

AIR FORCE SYSTEMS COMMAND
BROOKS AIR FORCE BASE, TEXAS 78235

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ROSS L. MORGAN, Technical Director
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This paper describes an early phase of a study to identify factors that influence the technical, physical, and psychological environment within which Air Force maintenance is performed. Findings will be used to establish a comprehensive plan for application of existing technology to current problems and a long-range plan for conduct of new research. Phase II, reported herein, developed the data-collection and analysis procedures and instruments, and field tested them. The primary data collection method was a structured interview. The interviewee selected the topics to be discussed, in response to open-ended questions such as, "What do you think could be done to improve Air Force maintenance?" The interviewer's role was to ask clarifying questions and to record the interviewee's statements. The statements are later categorized into one or more of about 200 categories and entered into a computer in subsequent phases. The data collected from active duty, Air Force Reserve, and Air National Guard aircraft maintenance

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organizations and missile maintenance organizations will be used to develop and prioritize research programs and plans for rapidly applying existing technology to identified problems.

AFHRL Technical Paper 81-32 January 1982

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By

Andrew P. Cuenzoff
Reid P. Joyce

Applied Science Associates, Inc.
Box 158
Valencia, Pennsylvania 16059

Reviewed by

Wendy B. Campbell
Maintenance Performance Section

Robert C. Johnson
Chief, Maintenance Performance Section

Submitted by

William B. Askren
Senior Scientist, Logistics Research Branch

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MAINTENANCE ENVIRONMENT IMPROVEMENT ANALYSIS: PHASE II - PRETEST

Background to the Study

The objective of the overall study is to obtain a deeper understanding of the factors that influence Air Force maintenance, from the perspective of the persons most actively involved. The findings will be used to establish a comprehensive, long-range plan for the application of existing technology, and for the conduct of new research. Its primary focus is on the perceived impacts of certain factors on the performance of individuals, groups, and organizations responsible for maintaining aircraft and missile weapon systems. The primary method of data collection will be through the use of structured interviews, conducted one-on-one at selected Air Force installations. The overall study is divided into six phases. The first two phases are preparatory; the next three phases involve data collection; and the last phase addresses what needs to be done about the issues raised by the maintenance persons who were interviewed.

Phase I of the study involved review of the literature and development of proposed data-collection and analysis procedures and instruments. The purpose of Phase II, reported here, was to test the data-collection and analysis instruments and procedures by implementing them to collect and analyze data from representative maintenance units at an Air Force base. On the basis of the results of the pretest, the project plan, data-collection instruments, and data-collection methodology were to be modified as necessary to correct deficiencies and to ensure that the goals of the project are met. The final project plan contains finer detail about the actual study instruments and procedures; this paper is intended to describe the conduct and outcome of the pretests conducted in Phase II. The data-collection effort will be conducted in three distinct phases. The first (Phase III) will cover data collection involving active duty aircraft forces; Phase IV will cover Air Force Reserve (AFRES) and Air National Guard (ANG) forces; and Phase V will cover missile forces. Separate data-collection visits are also planned to each of the headquarters of the major commands (MAJCOMs) and Direct Reporting Units involved in the study: Air Training Command (ATC), Military Airlift Command (MAC), Strategic Air Command (SAC), Tactical Air Command (TAC), Air Force Reserve (AFRES), Air National Guard (ANG), and the Deputy Commander for Air Defense (TAC). Visits to the headquarters of United States Air Forces of Europe (USAFE) and Pacific Air Forces (PACAF) will be combined with normal data collection trips to these commands.

This paper describes the instruments and procedures as they existed at the beginning of Phase II, the conduct of the pretests, and the modifications to instruments and procedures that resulted from them.

Background to Phase II

One hazard in an investigation of the factors affecting maintenance is that the investigators can bias the results in the direction of the

maintenance factors they feel to be important. To reduce the effect of interviewer preconceptions, it was decided to use open-ended questions in the interviews. However, there was a question concerning whether open-ended questions could yield the required types and amount of data. This issue was resolved during a one-day tryout at the Springfield, Ohio, Air National Guard unit and a one-week test of procedures at Langley AFB, Virginia.

Springfield Interviews

A one-day tryout of the open-ended-question approach was conducted on 4 April 1980. The tryout was conducted by two persons from the Air Force Human Resources Laboratory (AFHRL) and one from Applied Science Associates (ASA). The tryout consisted of interviewing two members of the 178th Tactical Fighter Group, Ohio Air National Guard, in Springfield, Ohio. Some of the questions that were asked are the following:

What are the most important things that could be done to improve Air Force maintenance?
What keeps you from doing your job well? What keeps your unit from being the best?
How do you feel about your job? Are you happy as a mechanic? Do you think the other people are happy?
We want you to talk about (from your perspective) what could be done to improve maintenance. What do you think is important to maintenance?
What's good about maintenance? What about it works well?
What alternatives do we have, to get better maintenance performance?
Is there a way to improve the situation?
Is there anything else that could improve maintenance?

On the basis of this limited tryout, it was concluded that the open-ended approach held great promise for providing the required types and quantity of data. The approach was also desirable because it did not force the interviewers' preconceived notions of the factors affecting Air Force maintenance on the data generated by the interviewees.

Although the Springfield interviews were quite productive, there remained the possibility that some interviewees might not be able to think of many responses to such open-ended questions. To cover this eventuality, a model of "technician needs" was devised, to be used as a prompting device. This model listed 52 general factors believed to have some impact on the performance of maintenance personnel. (A later version is shown in Figure 1.) When this list of factors is shown to an interviewee, he or she is presented with a comprehensive, broad choice of topics to explore with the interviewer. Again, the intention is to avoid steering the interview in any specific direction. This device was used in the pre-pretest conducted at Langley AFB.

Langley Pre-Pretest

A one-week pre-pretest of materials and procedures was conducted during the week of 19 May 1980. The pre-pretest was conducted by two persons from

TECHNICIAN NEEDS

TECHNICAL COMPETENCE	MOTIVATION	EQUIPMENT SUPPORT
Self Experience Training - Technical School On-the-Job Training Field Training Detachment Cross Utilization Training Career Development Course Professional Military Education Others Technicians Supervisors Officers	Job Satisfaction Job Status Job Involvement/Caring Identification With Unit Desire to do a Complete Job Patriotism Feedback Discipline/Conformity Off Duty Factors - Living Conditions, Housing Recreation, Social Interactions	Hand Tools Test Equipment Aerospace Ground Equipment Automatic Test Special Tools Protective Clothing Spare Parts Bench Stock Prime Equipment
METHODS SUPPORT	**WORK ENVIRONMENT**	**PERSONNEL POLICY**
Troubleshooting Procedures Technical Orders Inspection Work Cards Maintenance Office Instructions Local Work Rules Regulations Forms Preparation Job Scheduling	Physical 0 Cold/Heat 0 Lighting 0 Noise 0 Space/Facilities 0 Transportation Psychological 0 Supervision 0 Work Pressure Organizational 0 Job Structure 0 Combat Oriented Maintenance Organization/66-1 0 Work Distractions/ Non-Maintenance Duties Manpower Availability	Selection Promotion Assignment Retention Transfer Pay Benefits Enlisted Incentives

Figure 1. Technician Needs Prompting Device - Revised Version

AFHRL and three from ASA. Twenty-nine individuals from the 1st Tactical Fighter Wing at Langley AFB were interviewed.

An in-briefing and an out-briefing with the Deputy Commander for Maintenance (DCM) were conducted. Since such briefings are to be conducted at each base to be visited, the Langley trip provided a good test of procedures. It provided an indication of how much needs to be said and how it should be said.

A major issue explored during the pre-pretest was the requirement for the "technician needs" prompting device, and if required, at what point during the interview it should be introduced. The conclusion was that this device is useful for interviewees who quickly run out of topics in response to open-ended questions. However, it was deemed inadvisable to start each interview with a presentation of the "technician needs" device. When an interview is productive without using this device, its omission avoids even the small amount of results bias that it would introduce. It was further found that a few of the factor names were not easily understood by the interviewees. Therefore, a less complex version of the "technician needs" list (Figure 1) was prepared after the Langley AFB test.

Secondary purposes of the Langley pre-pretest were:

a. To determine whether it would be profitable to tape record the interviews,
b. To test whether it is possible to capture the interview data through note taking, and
c. To begin categorizing the data that were obtained, with a view toward building a categorization scheme to be used with subsequent data.

Tape recording did not appear to inhibit the interviewees, and it was found useful in evaluating the effectiveness of note taking. However, having judged that note taking was an effective method for capturing the data, it was concluded that tape recording involved more effort (in transcribing the data) than it was worth.

A major effort to devise the data-categorization structure was begun at Langley AFB. The topics discussed by the Langley interviewees were extracted from the interview notes and later sorted into the six major categories of the "technician needs" model. The resulting categorization structure (Figure 2) was the one used at the beginning of Phase II.

Phase II Method

A full-scale pretest of data collection procedures and forms, and data reduction and analysis procedures was conducted at Little Rock AFB, Arkansas, during the period 8 through 19 September 1980. Three AFHRL personnel and five members of the ASA project staff conducted interviews with 107 aircraft maintenance personnel of the 314th Tactical Airlift Wing (TAW).

Category	
01	Technical Competence
01 01	Technicians
01 02	Supervisors
01 03	Officers
01 04	Men vs. Women
01 05	Education (3 R's)/Intelligence
01 06	Experience
01 07	Training
01 07 01	Technical School
01 07 02	On-the-Job Training (OJT)
01 07 03	Field Training Detachment (FTD)
01 07 04	Cross Utilization Training (CUT)
01 07 05	Career Development Course (CDC)
01 07 06	Management/Professional Military Education (PME)
02	Motivation/Morale
02 01	Job Satisfaction/Career Field Satisfaction
02 02	Job Status/Visibility
02 03	Desire to Do a Complete Job
02 04	Job Involvement/Motivation/Caring
02 05	Identification/Affiliation with Unit
02 06	Patriotism
02 07	Feedback
02 07 01	Information
02 07 02	Evaluation/Approval
02 08	Reasons Why Morale is Good
02 09	Discipline/Obedience/Conformity with Rules
02 09 01	Excessive
02 09 02	Insufficient
02 09 03	General
02 09 04	Consistency
02 10	Off-Duty Factors
02 10 01	Living Conditions
02 10 02	Recreation
02 10 03	Housing
02 10 03 01	Off-Base
02 10 03 02	On-Base
02 10 04	Social Interactions/Social Environment
02 10 05	Educational Opportunities
02 10 06	Moonlighting

Figure 2. Statement Categorization Scheme Used at Little Rock AFB

Category	
03	Equipment Support
03 01	Hand Tools
03 02	Test Equipment
03 03	Aerospace Ground Equipment (A.G.E.)
03 04	Automatic Test Equipment
03 05	Special Tools
03 06	Tool Management
03 07	Protective Clothing
03 08	Bench Stock/"Scrounge Bins"
03 09	Supply Procedures
03 10	Prime Equipment
03 11	Spare Parts
03 11 01	Availability
03 11 02	Serviceability (Spares that don't work)
03 11 03	Reliability (Spares that fail quickly)
04	Methods Support
04 01	Troubleshooting Procedures
04 02	Technical Orders (T.O.s)
04 03	Inspection Work Cards
04 04	Forms Preparation
04 05	Job Scheduling
04 06	Maintenance Office Instructions (MOIs)
04 07	Local Work Rules
04 08	Regulations
05	Work Environment
05 01	Physical
05 01 01	Cold/Heat
05 01 02	Lighting
05 01 03	Noise
05 01 04	Space/Facilities
05 01 05	Transportation
05 02	Psychological
05 02 01	Supervision
05 02 01 01	Non-Commissioned Officers
05 02 01 02	Maintenance Officers
05 02 01 03	DCM and Higher Management
05 02 01 04	Supervisory Style

Figure 2. Statement Categorization Scheme Used at Little Rock AFB (continued)

Category	
05 02 01 05	Supervisory Role
05 02 02	Work Pressure
05 02 02 01	Excessive Pressure
05 02 02 01 01	Flying Schedule
05 02 02 01 02	Requirement for Perfection
05 02 02 01 03	Deadlines
05 02 02 02	Mobility Exercises
05 02 02 03	Temporary Duty
05 02 02 04	Hours
05 02 02 04 01	Scheduled
05 02 02 04 02	Overtime
05 02 03	Maintenance Organizational Structure
05 02 03 01	POMO (66-5)
05 02 03 02	AFR 66-1
05 02 04	Job Structure
05 02 04 01	AFSCs
05 02 04 02	Duties within AFSCs
05 02 05	Work Distractions
05 02 05 01	Non-Maintenance Duties
05 02 05 02	Training
05 02 05 03	Meetings
05 02 05 04	Administrative Paperwork
05 03	Manpower Availability
05 03 01	Technicians
05 03 02	Supervisors
05 03 03	Officers
06	Personnel Policy
06 01	Selection
06 02	Promotion
06 02 01	Criteria
06 02 02	Frequency
06 02 03	Specialty Knowledge Tests
06 02 04	Weighted Airman Promotion System
06 02 05	"Up-or-Out"/High Year of Tenure (HYT)
	Career Path Availability
06 03	Assignment
06 04	Retention
06 05	Transfer
06 05 01	Frequency
06 05 02	Location
06 05 03	Involuntary Transfer

Figure 2. Statement Categorization Scheme Used at Little Rock AFB (continued)

Category	
06 06	Pay
06 07	Benefits
06 07 01	CHAMPUS Health Benefits
06 07 02	Educational Assistance
06 07 03	Other
06 08	Enlisted Incentives
06 08 01	Reenlistment Bonus
06 08 02	Guaranteed Training
06 08 03	Other

Figure 2. Statement Categorization Scheme Used at Little Rock AFB (concluded)

Subject Sampling and Scheduling

In identifying the types of personnel to be interviewed, the emphasis was on obtaining data from every level of the maintenance complex, and from every specialty relevant to aircraft maintenance. The aim was to conduct at least 100 interviews; more, if time permitted. Several weeks prior to the pretest, a personnel roster for the 314th TAW (obtained from the AFHRL personnel data base at Brooks AFB) was used to select randomly some names of individuals in the desired Air Force Specialty Codes (AFSCs) in each of the organizations to be visited at Little Rock. A list of the organizations, AFSCs, and individuals' names was sent to the project liaison officer at Little Rock, with the understanding that the named individuals would be provided to the extent that schedules permitted, and that if substitutions were made, the substitutes would be of the same organization, AFSC, and sex, if possible. The types of personnel shown in Figure 3 were requested. The types of personnel actually interviewed are shown in Figure 4. Figure 4 also shows the sex, rank, and specialty distributions of the 107 Little Rock interviewees.

The interview schedule followed at Little Rock AFB is shown in Figure 5. The letters A, B, and C in Figure 5 stand for interviews performed by ASA personnel; the letter H stands for interviews conducted by AFHRL personnel. A representative number of interviews were scheduled for the day shift, swing shift, and night shift.

Interview Procedures and Forms

The interviews were approximately an hour in length. Each interview was an open-ended, private, one-on-one process, with the interviewer taking notes and asking probing, clarifying questions to explore the topics chosen by the interviewees. The interview began with an introduction. The interviewer introduced himself and the sponsoring agency. He briefly outlined the project goals and explained the confidential and voluntary nature of the interviews. He then asked the the interviewee to sign a Privacy Act Statement (Figure 6). This form was signed in duplicate, and the interviewee was asked if he or she would care to retain a copy of this form. If the reply was affirmative, a copy was provided. The Privacy Act Statement used at Little Rock was found to be entirely satisfactory and was not altered for Phase III.

Next, the interviewer filled out a biographical data sheet on the interviewee. In preparation for Phase III, this form was reorganized to bring together similar information and to condense it onto a single page. (See Figure 7.) Six items have been added to the new forms. If the interviewee is in ANG or AFRES, the interviewer will ask the amount of time (if any) that the individual spent on active duty status and the time since active duty. Additional questions were asked about the interviewer's race, number of dependent children, whether presently married, and if married, whether the spouse is in the military. Each interviewer had a procedural checklist for use in conducting the interview. It contained the interview structure and a series of more-or-less interchangeable open-ended questions. The basic procedure that was followed is shown in Figure 8. The only difference between

DCM/STAFF

1. Deputy Chief Maintenance
2. Wing Maintenance Superintendent
3. Job Control Officer
4. Quality Control Technician
5. Maintenance Control Technician
6. Plans & Scheduling Technician
7. Training Technician
8. Mobility Technician
9. Analysis Technician
10. Aircraft Maintenance Officer (Quality Control)
11. Supply Operations Officer (Material Control)
12. Inventory Management Specialist (Material Control)
13. Maintenance Manager (Maintenance Control)

OMS	FMS	AMS
1. Commander	1. Commander	1. Commander
2. Acft Maint Officer	2. Acft Maint Officer	2. Acft Maint Officer
3. Acft Maint Officer	3. Acft Maint Supt	3. Acft Maint Officer
4. Acft Maint Supt	4. Acft Maint Supt	4. Acft Maint Supt
5. Acft Maint Supt	5. Acft Maint Supt	5. Acft Maint Supt
6. Acft Maint Mgr	6. Acft Maint Mgr	6. Acft Maint Mgr
7-29. Various Technicians, Supvs, Officers Covering All Work Areas & Work Shifts	7-29. Minimum of two representatives of each AFSC in Sqdn	7-29. Minimum of two representatives of each AFSC in Sqdn

Figure 3. Sampling Plan - Little Rock AFB

SAMPLING DISTRIBUTION
LITTLE ROCK AFB

Subject Category	OMS N = 31	AMS N = 31	FMS N = 33	Staff N = 12	Total N = 107
Sex					
Male	28	29	29	11	97
Female	3	2	4	1	10
Rank					
E-1					
E-2	1		2		3
E-3	1	1	7		9
E-4	4	6	7		17
E-5	7	7	4	3	21
E-6	3	6	3	1	13
E-7	5	5	4	2	16
E-8	4	3	2		9
E-9	2	1	2	2	7
O-1			1		1
O-2	1			1	2
O-3	2	1	1	1	5
O-4		1		1	2
O-5	1				1
O-6				1	1
Specialty					
4016	1	1			2
4021	1		1		2
4024	2	1	1	2	6
4091				1	1
6424				1	1
32450		2			2
32550		2			2
32551		1			1
32571		3			3
32850		2			2
32854		1			1
32870		3			3

Figure 4. Sampling Distribution - Little Rock AFB

SAMPLING DISTRIBUTION
LITTLE ROCK AFB
(continued)

Subject Category	OMS N = 31	AMS N = 31	FMS N = 33	Staff N = 12	Total N = 107
32871		5			5
32874		1			1
32899		1			1
32900		1			1
34153		1			1
34156		1			1
34173		1			1
34174		1			1
34176		1			1
34197		2			2
39150				1	1
39270				1	1
42353			2		2
42355			2		2
42351			1		1
42370			1		1
42373			1		1
42374			3		3
42375			1		1
42399			1		1
42652			1		1
42653			1		1
42673			2		2
42699			1		1
42731			1		1
42733			1		1
42750			1		1
42751			2		2
42753			1		1
42754			1		1
42755			2		2
42799			1		1
43132	2				2
43152	8		1		9
43172	10			2	12
43199	5		1		6

Figure 4. Sampling Distribution - Little Rock AFB
(continued)

SAMPLING DISTRIBUTION
LITTLE ROCK AFB
(concluded)

Subject Category	OMS N = 31	AMS N = 31	FMS N = 33	Staff N = 12	Total N = 107
43200	2		2	2	6
64570				1	1
75193				1	1

Figure 4. Sampling Distribution - Little Rock AFB
(concluded)

INTERVIEW SCHEDULE

	M	TU	W	TH	F	S	M	TU	W	
0430				BC	AH	BC	BC	AH	AH	
0700		ABC		ABC	ABCH	ABC	ABC	ABCH	ABC	
1000	ABC	ABC	ABC	ABCH	ABC	ABC	ABCH	ABC	ABCH	
1330	ABC	ABC	ABC	ABC	ABC	ABC	ABC	ABC	ABCH	
1600			ABC	AH	BC		AH	BC	BC	
	6	9	9	14	14	11	14	14	15	106
								UNSCHEDULED		1
								TOTAL		107

Figure 5. Little Rock Interview Schedule

PRIVACY ACT STATEMENT

In accordance with paragraph 30, AFR 12-35, the following information is provided as required by the Privacy Act of 1974.

A. This interview is part of an effort by the Air Force Human Resources Laboratory (AFHRL) to explore various alternatives for improving maintenance operations. The interview provides an avenue of communications between the individuals directly involved in maintaining Air Force equipment and AFHRL. The information gathered in these interviews will be used to generate possible improvements in maintenance and personnel procedures and environment.

B. Your participation in this interivew is entirely voluntary. If you choose to participate, you are encouraged to provide complete and accurate information, in the interests of improving the maintenance job and the psychological climate in which it is performed. However, no adverse action of any kind will be taken against any individual who declines to provide any or all of the information requested.

C. Your participation in this study will be strictly anonymous. The information you provide will be combined with information from other participants. Full confidentiality of your responses will be maintained in processing the data and in reporting the results. Your name or organization will not be associated with the information you provide, in any resulting report.

D. If you choose to participate in this interview, please sign below to indicate that you have read this statement.

E. If you wish, you may retain a copy of this notice. Simply detach and keep the second sheet of this form.

Signature _____ Date _____

Figure 6. Privacy Act Statement

0026 BIOGRAPHICAL DATA

(1) BASE CODE: _____ NAME: _____ (2) SUBJ #: _____

(3) AGE: _____ (4) SEX: _____ (5) RACE: _____ (6) MAR. STATUS: _____

(7) MIL. SPOUSE: _____ (8) # DEP. CHILD. _____

(9) PREFIX: _____ (10) AFSC: _____ (11) SUFFIX: _____ (12) SEI: _____

(13) JOB TITLE: _____

(14) MIL/CIV CODE: _____ (15) MIL GRADE: _____ (16) CIV GRADE: _____

(17) DUTY TYPE: _____ (18) AFRES/ANG STATUS: _____

(19) TIME IN SERVICE: _____ months (20) TIME IN MAINT: _____ months

(21) TIME SINCE HANDS-ON: _____ months (22) TIME IN SUPV: _____ months

(23) R/A TIME IN ACTIVE DUTY: _____ (24) R/A TIME SINCE ACTIVE DUTY: _____

(25) CMD/AGCY CODE: _____ (26) CMD LEVEL CODE: _____

(27) ORGANIZATION-POSITION DATA: 66-5(1) _____ 66-1(2) _____

DCM(01) _____ MMICS(02) _____ ADMIN(03) _____ PRO/MOB(04) _____

TNG. MGT(05) _____ PROD. ANAL(06) _____ QC/QA(07) _____

PLANS/SCHED-DOC(08) _____ JOB CON(09) _____ MAT CON(10) _____

AGS(21) _____ EMS(22) _____ CRS(23) _____

OMS(31) _____ FMS(32) _____ AMS(33) _____ MMS(34) _____

UNCODABLE(44) _____ (28) SUPPLEMENT: _____

(29) SQUADRON: _____ (30) WEAPONS SYSTEMS: _____

(31) INT. DATE: _____y _____m _____d (32) TIME: _____

(33) INTERVIEWER: _____

Figure 7. Biographical Data Form - Phase II

INTERVIEW PROCEDURES

1. Introduce yourself and organization.

2. Briefly discuss project goals.

3. Stress confidentiality and voluntary participation.

4. Present Privacy Act Statment.

5. Collect biographical data.

6. Ask what kind of work subject does.

7. Ask: What do you think could be done to improve Air Force maintenance?

   What do you think could improve your work and attitude on the job?

   What do you think is the best thing about this squadron? The Air Force in general?

9. If subject "runs down" within the first half hour, present the "Technician Needs" list and say: "This is a list of topics we believe has some of the important factors in Air Force maintenance. We would like you to take a look at it and see if there is anything else there you'd want to comment on. You certainly do not have to talk about any of these."

10. Thank the subject.

Figure 8. Interview Procedures

the interview structure shown in Figure 8 and the procedures followed during the Little Rock pretest lay in the emphasis placed on effective policies and procedures in Step 7. It was made clear that "things done right" are as important as impediments to effective maintenance, since methods found effective by one organization might be useful for others.

Data Reduction Procedures and Forms

Immediately after each interview, the interviewer transcribed the biographical data onto a data reduction form and transcribed the rough notes, one statement at a time, onto data reduction sheets designed to facilitate computer entry. Each statement was then categorized according to the scheme presented in Figure 2. As many as three categories could be assigned to each statement. The category codes were entered on the statement reduction sheets.

Based on the Little Rock pretest, both of the computer data reduction forms were improved for Phase III. Figures 9 and 10 show the revised forms. The new forms have been printed in light green ink (instead of black) to increase the contrast between the data entries and the printed form. In addition, the items have been reorganized and the character blocks have been made smaller, to permit more rapid and accurate transcription of data.

By examining the data obtained at Little Rock, the categorization scheme (Figure 2) was considerably refined and expanded prior to Phase III. The revised scheme (Figure 11) was constructed around the original six major categories. However, new subtopics and sub-subtopics were added to increase coverage and specificity. Also, a few topics were renamed for greater clarity.

This process of refining the categorization scheme on the basis of new data will continue into Phase III. Essentially, the "technician needs" model (Figure 1) serves as the basic model, and when new data topics appear in the data, they are added to this model. In other words, the categorization scheme is being derived from the data themselves, as they are gathered. It is a hierarchical scheme, with levels in the hierarchy being added or taken away during development, as necessary to represent the data at a level of detail appropriate for later analysis. However, no attempt is being made to make a given level within one major category comparable to the same level within a different major category.

Computer Entry and Analysis

Upon return from Little Rock, all biographical data (except the interviewees' names), all recorded statements, and their categorizations were entered into the ASA computer. Portions of the data were printed out to demonstrate the capability of the software to sort the data on the basis of biographical factors. Two complete printouts of the data, sorted by statement category, were run. Between the times the two printouts were run, improvements were made in the output format. (The improved printout is shown in Figure 12.) The category codes were made easier to read by separating them with slashes. The readability of statements was increased by placing them in

0026 BIOGRAPHICAL DATA

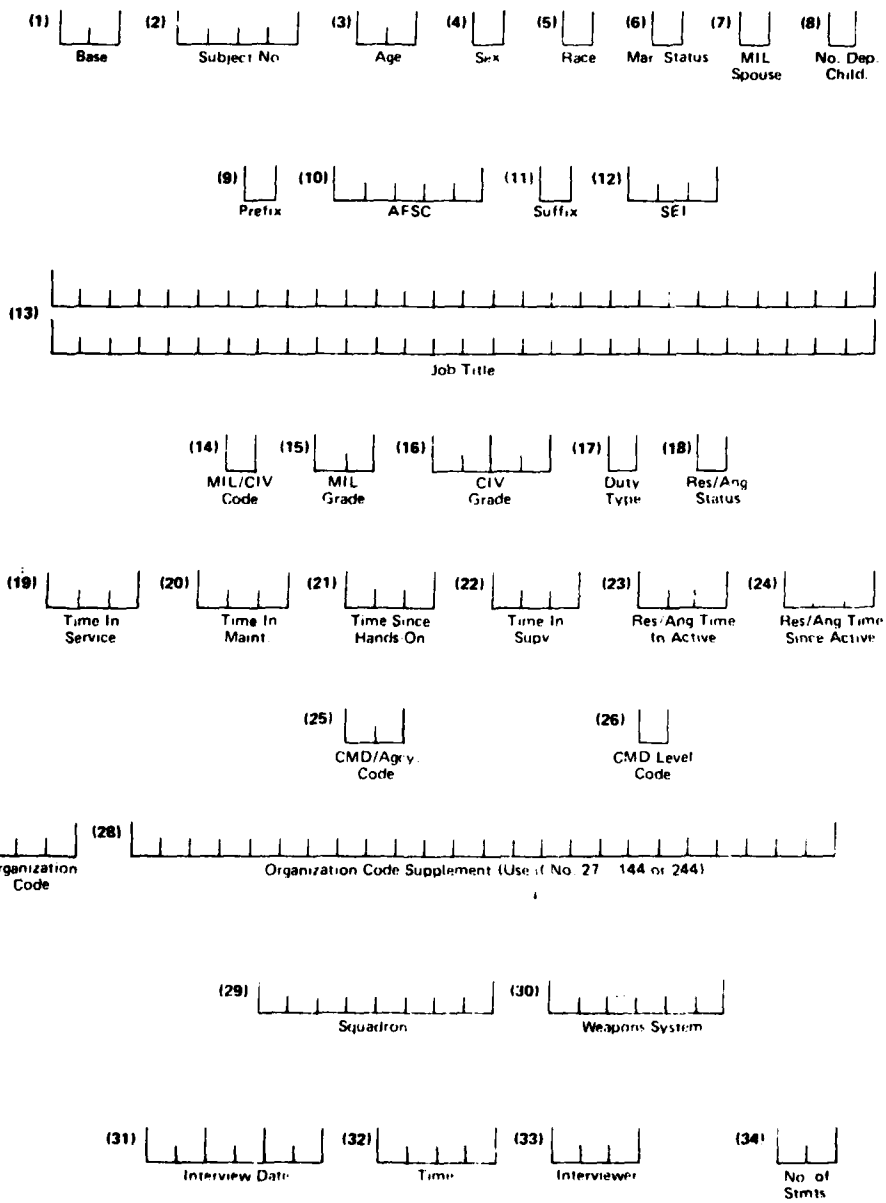


Figure 9. Biographical Data Reduction Form - Revised Version

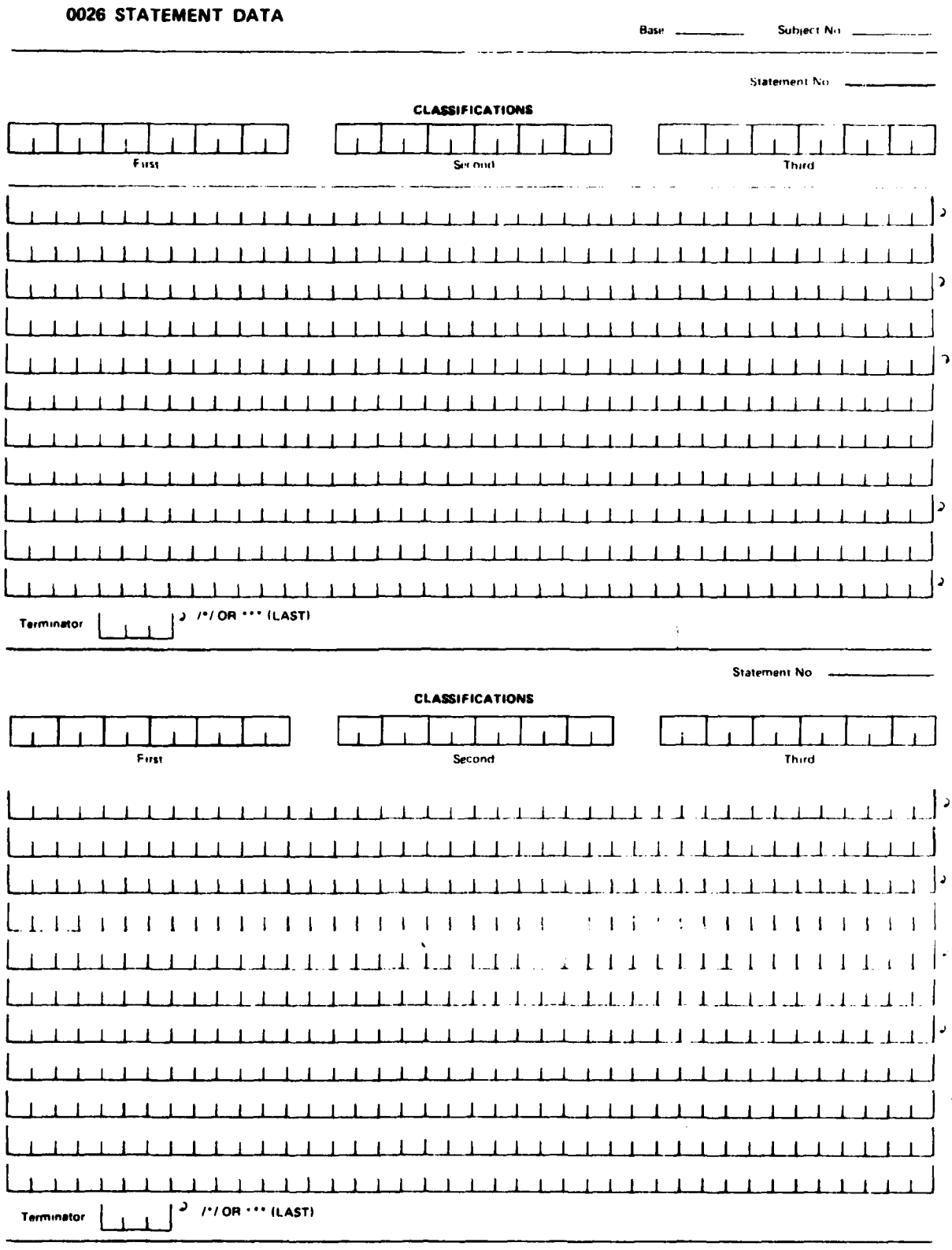


Figure 10. Statement/Categorization Data Reduction Form - Revised Version

STATEMENT CATEGORIZATION SCHEME – July 1981

01 COMPETENCE

01 01 Technician
01 02 Supervisor
01 03 Officers
01 04 Civilians
01 05 Men vs Women
01 06 Education (3 R's) Intelligence
01 07 Experience
01 08 Training
01 08 01 Tech School
01 08 02 OJT
01 08 03 FTD
01 08 04 CUT
01 08 05 CDC
01 08 06 Management/PME
01 08 07 Basic
01 08 08 Ancillary Annual Safety/Augmentee
01 08 09 Officer
01 08 10 Human Relations
01 08 11 Proficiency Advanced

02 MOTIVATION/MORALE

02 01 **Job/Task Satisfaction**
02 02 **Career Field Satisfaction**
02 03 **Job Status/Visibility**
02 04 **Desire to Do Responsible, Meaningful Work**
02 05 **Desire to Do a Complete Job**
02 06 **Job Involvement/Caring/Retiring on the Job**
02 07 **Unit Identification/Affiliation/Pride**
02 08 **Respect for Supervisors/Role Models**
02 09 **Feedback**
02 09 01 Information
02 09 02 Evaluation/Approval/Appreciation
02 09 03 Awards and Rewards
02 10 **Reasons for Remaining in AF**
02 10 01 Patriotism
02 10 02 Job Security/Steady Pay
02 10 03 Broadening Experience
02 10 04 Desire to Learn a Trade
02 11 **Cooperation/Competition/Conflict (among individuals or units)**
02 11 01 Within Maint
02 11 02 Maint vs. Other
02 12 **Discipline**
02 12 01 Excessive
02 12 02 Insufficient
02 12 03 Consistency
02 13 **Living Conditions**
02 13 01 Off-Base Housing
02 13 02 On-Base Housing
02 13 02 01 Privacy
02 13 02 02 Noise, Horseplay
02 13 02 03 Inspections
02 13 02 04 Family Housing
02 13 03 Food Services
02 13 03 01 Quality
02 13 03 02 Schedule
02 13 03 03 Availability
02 14 **Recreation**
02 15 **Social Interactions/Social Environment**
02 16 **Educational Opportunities**
02 17 **Family Life/Personal Life (effect of TDY, overtime, PCS, etc.)**
02 18 **Base Services (e.g., hospital, day care)**
02 19 **Discrimination**
02 19 01 Sex
02 19 02 Race
02 19 03 Marital Status
02 19 04 Civilian-Military
02 19 05 Rank
02 19 06 Maintenance vs Other
02 20 **Drug/Alcohol Abuse**

03 EQUIPMENT SUPPORT

03 01 **Hand Tools**
03 02 **Test Equipment**
03 03 **AGE**
03 04 **Automatic Test Equipment**
03 05 **Special Tools**
03 06 **Safety Equipment**
03 07 **Protective Clothing**
03 08 **Warm Clothing/Heaters**
03 09 **Weapons System**
03 09 01 Prime Equipment
03 09 02 Subsystems
03 09 03 Support Systems
03 09 04 Age/Obsolescence
03 09 05 Design for Maintainability
03 09 05 01 Accessibility
03 09 05 02 Ease of Troubleshooting/BITE
03 09 05 03 Ease of Replacement
03 09 06 Procurement
03 10 **Spare Parts**
03 10 01 Availability
03 10 02 Serviceability (Spares that don't work)
03 10 03 Reliability (Spares that fail quickly)
03 10 04 Maintenance Concept
03 10 05 Procurement
03 10 05 01 Normal
03 10 05 02 Local Purchase
03 10 05 03 Local Fabrication
03 10 06 Cannibalization
03 10 07 WRS Kit
03 10 08 Bench Stock
03 11 Misappropriation

04 METHODS SUPPORT

04 01 T.O.s
04 01 01 Troubleshooting Procedures
04 01 02 Repair/Replacement Procedures
04 01 03 IPBs/Wiring Diagrams/Schematics
04 02 Inspection Work Cards
04 03 Forms
04 04 Suggestion Program/AFTO 22's
04 05 Computer Maint. Management Aids
04 06 Job Scheduling
04 07 MOIs
04 08 Local Work Rules (unwritten)
04 09 Regulations
04 10 Tool Management Procedures (CTK)
04 11 Supply Procedures

05 WORK ENVIRONMENT

05 01 **PHYSICAL**
05 01 01 **Cold/Heat**
05 01 02 **Lighting**
05 01 03 **Noise**
05 01 04 **Space/Facilities/Rest Rooms**
05 01 05 **Transportation**
05 01 05 01 Serviceability
05 01 05 02 Availability
05 01 06 **Dirt/Grease**
05 02 **PSYCHOLOGICAL**
05 02 01 **Supervisory Style/Techniques**
05 02 01 01 NCOs
05 02 01 02 Maintenance Officers
05 02 01 03 Squadron Commander
05 02 01 04 DCM and Higher Management
05 02 02 **Work Pressure**
05 02 02 01 Flying Schedule
05 02 02 02 Requirement for Perfection
05 02 02 03 Deadlines/Inadequate Time
05 02 02 04 Mobility Exercises
05 02 02 05 TDY
05 02 02 06 Length of Work Days/Weeks/Shifts
05 02 02 07 Inspections (ORI, ORE, CAFI, QC, MSEP)
05 02 03 **Work Distractions/Non-Primary Duties**
05 02 03 01 *Details (up to 1 week)*
05 02 03 02 Temporary Duties (up to 90 days)
05 02 03 03 Extra Duties (concurrent)
05 02 03 04 Training (e.g., General Military Training)
05 02 03 05 Meetings
05 02 03 06 Appointments (e.g., records check, dental)
05 02 03 07 Administrative Paperwork
05 02 03 08 Task Interruptions
05 02 04 **Vertical Communication**
05 02 05 **Comradarie/Kidding/Horseplay**
05 03 **ORGANIZATIONAL**
05 03 01 **Maintenance Organizational Structure**
05 03 01 01 POMO (66-5)
05 03 01 02 66-1
05 03 01 03 Crew Chief System
05 03 01 04 Job Control
05 03 01 05 Quality Control
05 03 01 06 Span of Control
05 03 01 07 Unity of Direction/Command
05 03 02 **Job Structure**
05 03 02 01 AFSCs
05 03 02 02 Duties within AFSCs
05 03 02 03 Unpleasant Duties
05 03 02 04 Unwanted Supervisory Role
05 03 03 **Fiscal Management**
05 04 **MANPOWER AVAILABILITY**
05 04 01 **Technicians**
05 04 02 **Supervisors**
05 04 03 **Officers**
05 05 **SAFETY**
05 05 01 **Physical**
05 05 02 **Procedural**
05 06 **MISSION/WAR READINESS**

06 PERSONNEL POLICY

06 01 **Selection (into AF)**
06 02 **Promotion**
06 02 01 Criteria/APRs
06 02 02 Frequency
06 02 03 SKT's
06 02 04 WAPS
06 02 05 "Up-or-Out"/High Year of Tenure
06 02 06 Career Path Availability
06 02 07 Below-the-Zone
06 02 08 Local Authority
06 03 **Assignment (AFSC, Primary Job)**
06 04 **Retention**
06 05 **Transfer (PCS)**
06 05 01 Frequency
06 05 02 Location
06 05 03 Involuntary Transfer
06 05 04 Duration of Stay
06 05 05 Spouse
06 06 **Pay**
06 06 01 Basic Rate and Effects
06 06 01 01 Food Stamps
06 06 01 02 Working Spouse
06 06 01 03 Moonlighting
06 06 02 BAS/BAQ
06 06 03 Incentive (Flight, Hazardous Duty)
06 06 04 Clothing Allowance
06 07 **Benefits**
06 07 01 CHAMPUS Health Benefits
06 07 02 Tuition Assistance
06 07 03 Reimbursement of PCS Expenses
06 07 04 Housing Referral Ofc./Sponsor Program
06 07 05 BX & Commissary
06 07 06 Retirement Pension and Other Benefits
06 07 07 Overseas COLA
06 07 08 Leave
06 08 **Enlistment/Reenlistment Incentives**
06 08 01 Reenlistment Bonus/Leave Buy-Back
06 08 02 Guaranteed Training
06 08 03 Base of Preference
06 08 04 VEAP/G.I. Bill
06 09 **Recruiting/Indoctrination**
06 10 **Involuntary Separation**
06 11 **Draft vs. All Volunteer Force**
06 12 **Weight Program**
06 13 **AFR 35-10**
06 14 **Social Actions/EOT**

88 **Too general a statement**
99 **New category needed**

Figure 11. Statement Categorization Scheme - Phase III

```
**********************************************************************************************************************
  CATEGORIZATION CODE IS:   5/ 2/ 4/ 0/ 0/ 0                                          PRINT DATE: 11-NOV-80
TITLE:          5-2-4 JOB STRUCTURE                                                                          **
**
**********************************************************************************************************************
******
********** SUBJECT    82 STATEMENT  4
 CATEGORIZATIONS-- 1ST: 5/ 2/ 2/ 4/ 2/ 0  2ND: 5/ 2/ 4/ 0/ 0/ 0  3RD: 0/ 0/ 0/ 0/ 0/ 0
       **STATEMENT DATA**                                          **BIOGRAPHICAL   DATA**
THERE'S A BIG DIFFERENCE IN MAINT. FROM THE OTHER SIDE OF   **BASE: 77 AGE: 36 SEX: 1 PRFX:   AFSC: 42399 SUFX:
THE FENCE. WE WORK 12-HR SHIFTS WEEKENDS, DON'T GET         **SEI: 501 JOB: ASB SUPERINTENDENT
EXTRA PAY, BUT THEY GET PROMOTED JUST AS FAST.              **                                  MCIV: 1 MGRD:  8
                                                            **CGRD:    0 DTYP: 1 RCOD: 0 TSER: 222 TMNT: 222 TSAC:  24
                                                            **TSUP:  24 CMD:  3 CLVL: 5 OCOD: 232 SQDN: 314FMS
                                                            **WSYS:  C-130 IDAT: 80/ 9/ 8 TIME: 1330 IVWR: JTR #STS: 33


******
********** SUBJECT    82 STATEMENT 24
 CATEGORIZATIONS-- 1ST: 5/ 2/ 3/ 1/ 0/ 0  2ND: 5/ 2/ 4/ 0/ 0/ 0  3RD: 0/ 0/ 0/ 0/ 0/ 0
       **STATEMENT DATA**                                          **BIOGRAPHICAL   DATA**
IF THEY WANT TO GO TO POMO OR SOMETHING LIKE IT, THEY       **BASE: 77 AGE: 36 SEX: 1 PRFX:   AFSC: 42399 SUFX:
SHOULD MAKE EVERYONE A CREW CHIEF AND HAVE JUST A FEW SPE-  **SEI: 501 JOB: ASB SUPERINTENDENT
CIALISTS, AND LET CREW CHIEFS CALL ON THEM FOR THINGS       **                                  MCIV: 1 MGRD:  8
THE CHIEF CAN'T HANDLE.                                     **CGRD:    0 DTYP: 1 RCOD: 0 TSER: 222 TMNT: 222 TSAC:  24
                                                            **TSUP:  24 CMD:  3 CLVL: 5 OCOD: 232 SQDN: 314FMS
                                                            **WSYS:  C-130 IDAT: 80/ 9/ 8 TIME: 1330 IVWR: JTR #STS: 33


******
********** SUBJECT    99 STATEMENT  4
 CATEGORIZATIONS-- 1ST: 5/ 2/ 4/ 0/ 0/ 0  2ND: 3/ 9/ 0/ 0/ 0/ 0  3RD: 0/ 0/ 0/ 0/ 0/ 0
       **STATEMENT DATA**                                          **BIOGRAPHICAL   DATA**
"I FEELLIKE MY JOB IS UNCALLED FOR INA WAY" BECAUSE IT  IS  **BASE: 77 AGE: 28 SEX: 1 PRFX:   AFSC: 64570 SUFX:
REDUNDANT WITH THE MISSION CAPABILITY FUNCTION--EXCEPT THAT **SEI:      JOB: ASST NCOIC FOR MAINT/SUPPLY LIAISON
THEY ACTUALLY ORDER PARTS AND WE DON'T. MOST OF BOTH JOBS    **                                  MCIV: 1 MGRD:  5
COULD BE HANDLED BY THE BASE LEVEL CUSTOMER SUPPORT OFFICE  **CGRD:    0 DTYP: 1 RCOD: 0 TSER: 112 TMNT:  88 TSAC:   0
IN SUPPLY. IT'S GOOD TO HAVE THE DOUBLE CHECK, BUT IT'S     **TSUP:  96 CMD:  3 CLVL: 5 OCOD: 210 SQDN: 314TAW
GOTTEN TOTHE POINT WHERE EVERYBODY IS DOING EVERYBODY ELSE'S**WSYS:  C-130 IDAT: 80/ 9/15 TIME: 1600 IVWR: JTR #STS: 23
 JOB ALL THE TIME.


******
********** SUBJECT   123 STATEMENT  1
 CATEGORIZATIONS-- 1ST: 2/ 2/ 0/ 0/ 0/ 0  2ND: 5/ 2/ 4/ 0/ 0/ 0  3RD: 0/ 0/ 0/ 0/ 0/ 0
       **STATEMENT DATA**                                          **BIOGRAPHICAL   DATA**
CREW CHIEFS ARE SUPPOSED TO BE IN CHARGE OF THE PLANES. SPEC**BASE: 77 AGE: 25 SEX: 2 PRFX:   AFSC: 43132 SUFX:
IALISTS ARE SUPPOSED TOWORK FOR US, BUT WE END UP WORKING FO**SEI:      JOB: ACFT MAINT SPEC
R THEM.                                                     **                                  MCIV: 1 MGRD:  2
                                                            **CGRD:    0 DTYP: 1 RCOD: 0 TSER:  12 TMNT:  12 TSAC:   0
                                                            **TSUP:   0 CMD:  3 CLVL: 5 OCOD: 231 SQDN: 314OMS
                                                            **WSYS:  C-130 IDAT: 80/ 9/11 TIME:  430 IVWR: KRB #STS: 15
```

Figure 12. Improved Printout

one column. The readability of the biographical data was increased by providing abbreviated category names.

As many as three different categories could be assigned to each transcribed statement. Therefore, a relatively simple mechanism existed for exploring interactions among categories. It was mentioned previously that all data for Little Rock were sorted and printed out according to the categorization scheme. That is, all statements to which a given category was assigned were printed out together under that category. Any statement to which a second or third category was assigned was also printed out under each of the other categories. The 107 subjects generated a total of 1,610 statements, an average of just over 15 statements per subject. The interviewers assigned an average of 1.6 categories to the statements that they categorized. One of the first products under each category was a table (Figure 13) showing which other categories were assigned to the statements that followed and how frequently each of the other assigned categories appeared. In the example, the analyst can see at a glance that the subject category (Job Structure) was never the only one assigned to a statement; that two statements were related both to Job Structure and to 2.1.0.0.0.0 (Job Satisfaction/Career Field Satisfaction); and that 13 other categories were each related to Job Structure only once. When sufficient data have been accumulated, these categorization coincidence summaries are expected to yield an indication of interactions among categories. However, frequency of coincidence may or may not be found to indicate strength or importance of an association -- it only represents the number of statements in which individuals mentioned the topics together.

The 1,610 statements collected in the Little Rock pretest were distributed across the whole categorization scheme (Figure 2). Many categories were only lightly represented in the data; some categories were addressed by substantial proportions of the interviewees. Figure 14 shows a sample of the numbers of statements that fell into some of the more frequently appearing categories and sub-categories (not all pretest data are included -- only the most frequently used categories).

Although the data-management computer program allows for the derivation of shredouts of the data on most of the demographic variables (e.g., seeing if there are differences among AFSCs in the kinds of statements generated on a given topic), these voluminous products will be generated only to test hypotheses that emerge during analysis of the individual topics--they will not be produced automatically. An example of the results of such a shredout is presented in Figure 15. The pretest data collectors all received many comments on pay, but most of them had noticed what appeared to be a different viewpoint on pay problems as expressed by young enlisted troops, compared with people who had been in the Air Force for awhile. Our impressions were that the younger people felt genuinely hurt by the low pay, and that those who had been around for several enlistments felt they could at least make ends meet, but they were seriously concerned about the Air Force's ability to retain the improverished younger troops. As Figure 15 shows, those in their first three enlistments did express a direct negative impact from low pay. Those with

```
**********************************************************************************
 CATEGORIZATION COINCIDENCE SUMMARY FOR CATEGORY:  5/ 2/ 4/ 0/ 0/ 0
 TITLE:              5-2-4 JOB STRUCTURE
**********************************************************************************
******
 PRIMARY CATEGORY   5/ 2/ 4/ 0/ 0/ 0 APPEARED ALONE FOR     0 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   5/ 2/ 2/ 4/ 2/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   5/ 2/ 3/ 1/ 0/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   3/ 9/ 0/ 0/ 0/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   2/ 2/ 0/ 0/ 0/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   5/ 2/ 2/ 1/ 1/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   2/ 4/ 0/ 0/ 0/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   5/ 2/ 1/ 5/ 0/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   5/ 2/ 2/ 1/ 0/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   2/ 1/ 0/ 0/ 0/ 0 FOR     2 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   5/ 2/ 5/ 4/ 0/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   1/ 7/ 1/ 0/ 0/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   1/ 7/ 2/ 0/ 0/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   5/ 2/ 4/ 1/ 0/ 0 FOR     1 STATEMENTS
  5/ 2/ 4/ 0/ 0/ 0 APPEARED WITH   1/ 7/ 0/ 0/ 0/ 0 FOR     1 STATEMENTS
```

Figure 13. Sample Categorization Coincidence Summary Printout

FREQUENCY OF STATEMENT BY TOPIC

PSYCHOLOGICAL ENVIRONMENT		588
SUPERVISION	207	
WORK PRESSURE	144	
WORK DISTRACTIONS	134	
MAIN ORG STRUCT	61	
JOB STRUCTURE	42	
TRAINING		209
TECHNICAL SCHOOL	57	
QUALITY OF LIFE		142
ON BASE HOUSING	37	
MANPOWER AVAILABILITY		114
TECHNICIANS	72	
PAY		103
BENEFITS		97
PROMOTION		81
ASSIGNMENT		74
RETENTION		74
SPARE PARTS		66
DISCIPLINE/OBEDIENCE/ CONFORMITY WITH RULES		65
JOB INVOLVEMENT/ MOTIVATION/CARING		60
JOB SATISFACTION/ CAREER FIELD SATISFACTION		58
EXPERIENCE		55
TOTAL STATEMENTS		= 1610
TOTAL CATEGORIZATIONS		= 2580

Figure 14. Numbers of Statements Assigned to the Most-Frequently-Used Categories in the Pretest

Time in Service	# of Statements	Summary of Statements
0 - 4 yrs.	16	Four individuals said pay was no problem; others cited inadequate compensation for hazardous duty, environmental conditions, inflation.
4 - 8 yrs.	29	Low pay requires outside employment and food stamps; it affects the housing they can buy.
8 - 12 yrs.	20	Pay is inadequate and affects attitude. Flying status for crew chiefs would help.
12 - 16 yrs.	11	Pay of younger airmen is a big problem, causing low re-enlistment rates.
16 - 20 yrs.	10	Low pay affects younger airmen more severely. Some respondents were not sure that pay is problem.
20 - 24 yrs.	8	Pay causes low reenlistment of younger airmen; not hurt personally.
24 - 28 yrs.	6	Not hurt; pay is not the most important problem.
Over 28 yrs.	5	Other compensation lacking; need for job status and comfortable life.
	105	

Figure 15. Pay Category, With Time-In-Service Shredouts

more time in service expressed concern for their younger colleagues, but seemed to feel a greater personal need for job status and other compensation than for more pay.

Conclusions

The Phase II pretest was an extremely valuable portion of the project. It permits researchers to enter Phase III with procedures and forms in which they can have considerable confidence. The interview techniques were extremely effective in getting the interviewees to speak of factors that affect maintenance. At the same time, the interviewees occasionally left a good deal unsaid, such as information concerning the prevalence or frequency of a problem, and it is clear that the interviewers must elicit such information, for use in structuring and prioritizing research issues and technology applications. Many more problems than constructive solutions were mentioned. In Phase III, it will be up to the interviewers to improve in establishing the dimensions of the problems and in eliciting any solutions the interviewees might be able to offer.

As far as forms are concerned, each form (except the Privacy Act Statement) has undergone revision to improve usability or readability or both. The sample size (107) and the facts that a different command, different organizational structure, and different aircraft were involved at Little Rock (compared with Langley) permitted a considerable expansion of the categorization scheme. It is intended to limit any further categorization scheme changes to simple additions to the present structure. This will greatly facilitate computer storage and retrieval of the data by holding constant the numerical codes assigned to the present categories.

Finally, it was abundantly clear that the members of the data-collection team, being extensively experienced in Air Force maintenance, were able to establish more than enough credibility in the host organizations, from the beginning. As word quickly spread that the team was both knowledgeable and concerned, some people began coming to the interviews with notes scribbed on cards or sheets of paper: things they wanted to be sure they got a chance to tell the interviewer. Some individuals, who found that they were not scheduled for interviews, began to volunteer to "get on the list." Several interviewers found themselves spending portions of their "free time" engaged in "informal interviews" that were aggressively initiated by individuals who sincerely wanted to pass on some of their thoughts, even though they were not scheduled for an interview.

To summarize, the major accomplishments of Phase II were the following:

1. The interview procedures were devised, tested, and refined, on the basis of tryouts conducted at three Air Force installations.

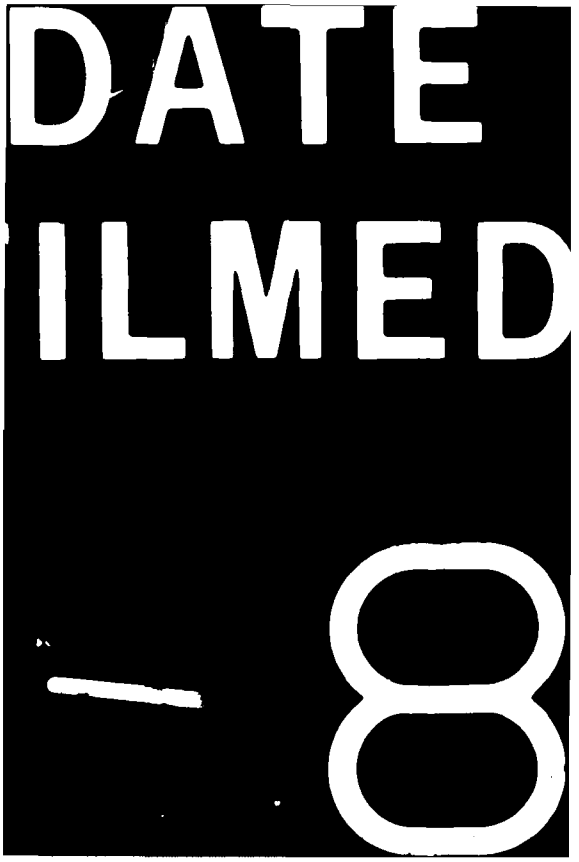
2. Forms were prepared, tested, and revised considerably to improve usability and readability.

3. The data categorization scheme evolved from a "bare-bones" model to a scheme with approximately 200 usable categories.

4. Computer software was prepared to accomplish data entry, file manipulation, and data output.

5. The pretests showed that careful pre-trip coordination, effective procedures, and knowledgeable, attentive interviewers yielded extremely cooperative interviewees.

6. The pretests indicated that the procedures would result in data that meet the goals of the data collection phase -- unbiased statements from all levels of maintenance personnel about the things and circumstances that impact the performance of their jobs. These data will provide the information required to develop an effective maintenance research program.


DATE
ILMED
8